

**U.S. EPA Environmental Technology Verification Program
Advanced Monitoring Systems Center**

Air Stakeholder Committee Meeting

**June 24, 2004
Indianapolis, IN**

MEETING MINUTES

ATTENDEES

Stakeholder Committee Members:

Cliff Glowacki, TECHNIKON
Tom Logan, U.S. EPA/OAQPS
Will Ollison, American Petroleum Institute
Judy Chow, Desert Research Institute
Susan Wierman, Mid-Atlantic Regional Air Management Association
Roy Owen, Owings Corning
Ernie Bouffard, Connecticut Department of Environmental Protection

Observers:

Tim Zahn, Quality Data Systems, Inc.
Miriam Lev-On, The LEVON Group, LLC
Gary Hunt, TRC Environmental
Mark Reed, University of Illinois
James Jahnke, Source Technology Associates
Lawrence Friedl, NASA Headquarters, Office of Earth Science
Brian Kim, Army Corp of Engineers

EPA/Battelle AMS Center Staff:

Gretchen Hund, Battelle/PNNL
Tom Kelly, Battelle
Karen Riggs, Battelle
Teresa Harten, EPA/ETV Program/ORD/NRML
Evelyn Hartzell, EPA/ETV Program/ORD/NRML

Welcoming, Agenda, and Meeting Objectives

Karen Riggs, the Battelle Project Manager for the ETV Advanced Monitoring System (AMS) Center, welcomed the committee stakeholders and observers attending. Teresa Harten, the EPA's ETV Program Director, also thanked everyone for attending the meeting and providing their support to the program. Karen mentioned that since this session was open to all attendees of the Air and Waste Management Association (A&WMA) annual conference, she planned on giving

more of an overview of ETV and the AMS Center. Other objectives included providing everyone with an update on AMS Center current and planned verification tests. After the mid-morning break, the stakeholders would reconvene to discuss their insights into ETV visibility and future technology categories and partners they recommended be pursued.

In Karen's overview of ETV, she described the objectives of ETV and the ETV values and quality criteria. She then walked through the full ETV process, defining the various steps in verifying the performance of a technology. One observer asked how long a typical test takes from beginning to end. Karen reported that the time depends greatly on the technology category but that one year was a typical figure for many technologies. She listed all seven centers that are part of ETV and gave some statistics describing the successes of ETV. Karen described some of the international activities and partnerships that are critical to testing. She gave examples of the outreach and communication activities that support the program and stressed the importance of these activities in increasing public awareness of ETV. She also emphasized the importance of stakeholder involvement in ensuring objectivity in testing and also in identifying and reaching vendors. Finally, she described the breadth of activities covered under the AMS Center.

Teresa Harten mentioned some of the budget challenges currently facing ETV that are making it difficult to pursue all of the technology categories of interest. She thanked everyone for their support of and interest in ETV.

Update of AMS Center Current and Planned Verification Tests

Tom Kelly, a verification testing leader from Battelle, gave this presentation. He reported that the following list is of all of the technology categories that have been tested to date:

- Portable NO/NO₂ monitors – July 1999, September 2000
- Open-path optical monitors – September 2000, March 2001
- Ambient PM_{2.5} monitors – August 2001
- Mercury CEMs – August 2001, September 2003
- XRF Multimetals CEM – May 2002
- Portable multigas emission analyzer – March 2003
- Onboard vehicle emission monitor – June 2003
- Ammonia CEMs – April 2004

Tom described the typical parameters used in verifying a technology's performance. He listed five technologies that would be the focus of his presentation.

1. Ammonia Continuous Emission Monitors (CEMs) at a Coal-Fired Power Plant– recently completed

Tom reported that this test was of ammonia CEMs that monitor NH₃ slip at a selective catalytic reduction (SCR) facility for nitrogen oxides removal. Power plants are interested in this technology category because it measures any ammonia that may be slipping through which can form particles that plug the air heater. The host site for the test was the American Electric Power Mountaineer coal power plant in New Haven, West Virginia. Both the Electric Power Research

Institute (EPRI) and EPA's Office of Air Quality Planning and Standards (OAQPS) were partners in the testing. EPRI was interested in how two different reference methods (EPA's ion chromatography and ASTM's ion selective electrode) compare in analysis of ammonium solutions, and OAQPS is developing a performance specification to which the test results would provide input. Two units participated in the test that are both cross-stack optical instruments (~20' path). The units were the Opsis LD 500 and the Siemens LDS 3000. There was some discussion as to whether the units were really continuous emission monitors or continuous process monitors. These units were not measuring emissions from the stack but measuring just down stream of the catalytic converter to determine how much ammonia was slipping through. These units were operated continuously for a month in the summer of 2003. They were challenged with ammonia gas standards and zero gas, using a cell in line with a cross-stack light path. Tom provided results on both units' performance. He suggested that observers interested in the results download the reports off of EPA's website. One observer commented on his concern that people see ETV-verified technologies as EPA *approved*. Karen Riggs strongly stated that this is not the purpose of ETV and that ETV's role is to report on performance, not judge the quality of the performance. The observer recommended making this clearer in the promotional material released.

2. Ambient Ammonia Monitors At Animal Feedlots – in progress

The second technology category described was ambient ammonia monitors used at animal feedlots. Seven vendors participated in this verification test. Two concentrated animal feeding operations (CAFOs) were used in the test – a swine feed operation in Ames, Iowa and a cattle feed yard in Carroll, Iowa. The U.S. Department of Agriculture was a significant partner in this test.

Seven vendors participated in the verification test using different types of technologies. The following list summarizes them:

- Aerodyne Research, Inc. – tunable diode laser spectroscopy
- Bruker Daltonics – open-path IR spectroscopy
- Molecular Analytics – ion mobility spectrometry
- Omnisens SA (Phase 2 only) – IR laser spectroscopy with photoacoustic detection
- Pranalytica, Inc. -- Near IR Laser Spectroscopy with photoacoustic detection
- R&R Mechatronics –membrane diffusion with conductivity detection
- Thermo Electron Corp. – conversion to NO with chemiluminescence detection

Phase 1 and Phase 2 of testing have been completed and the verification reports are in peer review with EPA approval expected by late June 2004. The results indicate that most of the units performed quite closely with the reference method.

The term ambient monitoring usually implies very low concentrations of a contaminant and stakeholders wanted to know the detection limit of these devices to determine if the units would be useful in other settings. One stakeholder remarked that the devices are really point source monitors more so than ambient and it would be worth knowing how well they work at low levels too. Another stakeholder reminded the committee that what is important is knowing the

regulatory driver – where would they be required. Tom Kelly reported that USDA is making recommendations about where to place them.

3. Mercury CEMs at a Coal-Fired Power Plant (Phase 3) - planned

Mercury CEMs have been tested under various conditions and this phase is to focus on a coal-fired power plant. Battelle has a verbal commitment of \$50,000 in co-funding from the Connecticut Department of Environmental Protection thanks to assistance from stakeholder Ernie Bouffard. Jeff Ryan from EPA/ORD is also expected to provide in-kind support of approximately \$25,000 to the test. Battelle has a proposal submitted to the Illinois Clean Coal Institute (ICCI) for \$170,000 for co-funding for the test and is expected to hear on its acceptance by August 2004. A condition for the ICCI grant is that the test must occur at a facility using Illinois coal. Battelle has had discussions with three utilities (Southern Illinois Power Cooperative, Amergen, and Dynegy) but it is uncertain at this time where this test will occur. Battelle is also soliciting CEM vendors. The plan is to have the CEMs installed by mid-October and have them continuously operating until mid-December. The Ontario Hydro reference method will be used at the beginning and end of the testing with mercury standards being challenged throughout the testing period. This test is largely contingent on receiving the ICCI funding. Four vendors have expressed interest in participating.

4. Hydrogen Sulfide Monitors at Animal Feedlots - planned

Tom Kelly explained that hydrogen sulfide is a problem at CAFOs because of worker exposure and facility emissions causing odor complaints. Concentrations can be at the few hundred ppb level. USDA is a partner in this test, planned to begin in September 2004 at a swine finishing farm. The test is planned to be in the field from 6 to 8 weeks. The vendors scheduled to participate in the test are:

- Ecotech (HTO1000 Oxidiser + EC9850 SO₂ analyzer)
- Environment S.A. (Converter CH₂S and SO₂ analyzer Model AF21M)
- Arizona Instrument (Jerome 631-X)
- Ionics Instruments (SSA 5504 (also SCD 355))
- Teledyne-API (H₂S and TRS analyzers)
- Boreal Laser (GasFinder)
- Thermo Electron (Model 45C)
- Detection Instruments (OdaLog Low Range Gas Logger and OdaLog Gas Logger if high range)

Stakeholders Will Ollison and Roy Owens expressed an interest in being reviewers of the test plan and performance report. It was also suggested to check with Jerry Hatfield to determine his interest in participating.

5. Dioxin CEMs at a Pilot Scale Incinerator

This was the last technology update provided. Battelle is collaborating with Brian Gullet of EPA and co-funding is being sought. The plan is to use the pilot incinerator at EPA/RTP as the host site for this test. Three vendors have expressed interest in participating. Dioxin CEMs may involve automated sampling for later analysis rather than conducting true in-situ analysis as for other CEMs.

Stakeholder Insights since the Last Meeting

Gretchen Hund asked the stakeholders to report on what their network has to say about ETV and specifically whether ETV's visibility seems to be improving or not.

For the benefit of the observers, each stakeholder introduced him or her self and described his or her role within his or her organization and interest in air monitoring. One stakeholder mentioned that he discusses ETV with various instrument vendors he encounters and that three of the observers were representatives from these companies. Another stakeholder reported that he links into the ETV website often and wishes that the *What's New* button was still active on the website and recommended reinstating it. He listed his priorities where he thinks ETV may be able to play some role: Title 5 and compliance assurance monitoring (CAM), which falls between CEM and spot checking including surrogates. Another stakeholder complemented Battelle and EPA on getting the article on ETV published in *EM*. She thought it was great visibility for the program. Another federal regulatory stakeholder reported that his time has been dominated by mercury source monitoring. He also felt that leak detection was important and that there are 3-4 vendors of remote leak detection units that are better than Method 21 and could be tested. He recommended contacting someone at Environ in Texas. His colleague overseeing the ambient program is primarily focused on PM coarse and NCore.

Evelyn Hartzell from EPA's ETV Program Office reported that she was responsible for writing the *EM* article and that her focus is to try and increase public awareness of the program. When asked about marketing vendor results (e.g., increase in sales) following a verification test, she commented that the vendor survey has been a bit limited in gathering quantitative data. Vendors are not required to track such results. EPA is in the process of awarding a contract to a firm to survey companies who have participated in ETV. The firm will pilot test a survey to gather better data. The ETV Program Office also hopes to have a booklet of case studies with responses and success stories by Spring 2005.

Discussion of Status and Future Technology Categories and Partners

Tom Kelly led this discussion about other technology categories that Battelle should consider based on feedback from stakeholders. He reminded stakeholders that the information Battelle needs to proceed with a new technology category are the names of vendors with commercial technologies that fit within the category, names of potential partners that can cost share the testing, and stakeholder volunteers to support the test.

As mentioned, the three technologies currently in the queue are:

- Mercury CEMs Phase 3 (coal-fired plant)
- Hydrogen sulfide (H₂S) monitoring at animal feed lots
- Dioxin CEMs

Gretchen asked for stakeholders to volunteer to be reviewers for the dioxin CEM verification test, given that Ernie Bouffard and Don Stedman had already offered to track mercury CEMs and Will Ollison and Roy Owens offered to track hydrogen sulfide monitors (with Jerry Hatfield being asked). Tom Logan, Ernie Bouffard, and Cliff Glowacki all offered to participate in supporting a dioxin CEM verification test. It was recommended that Battelle contact Praveen Amar to be an additional reviewer on the mercury CEM verification test.

To get the discussion going, Tom Kelly listed other potential categories that have been suggested/discussed in the past:

- On-board diesel emission monitor (O-TECH)
- Continuous PM_{2.5} monitors – Round 2
- Continuous ambient formaldehyde monitors
- Vapor intrusion (e.g., TCE) in buildings
- Ambient coarse PM measurement
- Leak detection monitors (smart LIDARs)
- Fine PM monitors for combustion sources
- Portable direct PM mass monitors (not surrogates)

The discussion began focused on continuous PM 2.5 monitors, given the great interest by many of the attending stakeholders in ambient monitoring. Stakeholder Judy Chow reminded the committee of the importance of identifying inexpensive (\$1-2K) and easy-to-use technologies that could be used in developing countries. The committee discussed the difficulties in launching a second phase verification test of ambient PM 2.5 CEMs – the costs and manpower needed to conduct the testing. The committee would like to see continuous composition monitors be included, but they recognize the additional manpower that would be needed to conduct this testing. Stakeholders mentioned nitrate, sulfate, and black carbon. It was recommended to brainstorm with stakeholder Tim Hanley from EPA on approaches for meeting this need. Stakeholder Judy Chow said that she could help with the Fresno SuperSite.

Also in the area of ambient air monitoring, the committee discussed EPA's NCore program – a look at revisiting EPA's entire ambient air monitoring network. The concept is that there is a pyramid consisting of three levels of monitors. The first level contains the most comprehensive monitoring sites (6-10, that are SuperSites). The second level is the states' network. Finally, the third level is comprised of the battery sites at many locations that are less expensive sites located around the second level to better understand spatial relationships and scale. Currently, EPA can only afford three first-level sites and politics are influencing where those sites will be located. It is recognized that there is a need for long-term permanent sites, ideally where they could be operated under an inter-agency agreement with another agency contributing to operational cost. Stakeholders discussed the possibility of ETV being more involved in the data analysis from such ambient sites and having others do the data collection to help bring down the costs. However, the point was raised that to collect data like continuous sulfate data, you would need to

have another hourly device to compare to the 24-hour unit, which would be labor intensive. Stakeholder Susan Wierman mentioned that LADCO is supporting the St. Louis Supersite.

The discussion then turned to ambient coarse PM monitoring. One stakeholder mentioned that coarse PM is also of interest to source monitoring. The issue was more on sampling than on CEMs, but monitors could be identified that would be applicable to both ambient and source. There is expected to be a standard released on PM coarse in a few years. It was recommended that Battelle contact Tim Hanley to find out more on the timing of this standard. Stakeholder Cliff Glowacki indicated that he might have some suggestions for PM coarse partners.

In discussing continuous ambient formaldehyde monitors, it was recommended that Battelle contact Aerolaser --- a German company that manufactures such devices. However, this category was not seen as a high priority.

With respect to vapor intrusion in buildings, it was recognized that faster GC detectors were needed that were portable. One stakeholder made the analogy to a radon detector. Stakeholder Cliff Glowacki didn't think that they existed. Stakeholder Will Ollison suggested looking at electron capture devices.

Leak detection monitors were seen as of higher priority. Stakeholder Tom Logan mentioned that EPA may change the rule for these monitors and would welcome ETV's participation in this area. These leak detectors would serve as a replacement for EPA method 21. On-going work he cited in this area was the company Sherlock (in CA) that makes a passive infrared device and Mr. Smylie with Environ in Texas. He mentioned contacting Karen Ritter at API who has funding from DOE and is aware of the players in this area. Finally, Sandia National Laboratory is also working in this area and has a laser back-scatter unit. It was suggested that stakeholder Andy McFarland might be able to suggest possible refinery partners for this test.

With respect to fine PM monitors for combustion sources, Cliff Glowacki felt that they were needed for more than combustion sources. He felt that foundries would be very interested. He listed the Steel Founders Society, American Founders Society, and EPRI as potential partners. There is a real need for leak detection monitors for particles (e.g., from broken bags). He mentioned that the Europeans have conducted extensive work on bag leak detection and would be a good reference. Vendor Rupprecht & Patashnick would likely be interested. PM 2.5 emission inventory is problematic for sources.

Tom Logan mentioned that EPA promulgated a performance specification (PS) for portable direct PM mass monitors (not surrogates) in January 2004. Dan Bivens is the contact at OAQPS who would know the full list of vendors active in this area. The PS would allow for optical and direct mass (e.g., TEOMs) monitors. He recommended pursuing this technology category.

The meeting ended with Gretchen Hund asking the stakeholders whether they found hosting the meeting in conjunction with a large air monitoring meeting (A&WMA) was beneficial. Stakeholders commented that they thought it was good to have observers attend to help improve ETV's visibility. They felt that if a meeting was upcoming that fit with the committee's interest and timing that Battelle should look into piggy-backing onto this meeting. One stakeholder

mentioned that there was a conference scheduled for March 13-18, 2005 at the Sonoma Double Tree Hotel in Rohnert Park, California titled *Stationary Source Sampling and Analysis for Air Pollutants Conference XXIX*. The conference is for the Source Evaluation Society and co-sponsored by the EPA, International Energy Agency, and the Source Testing Association. Although this conference is more appropriate for the stakeholders interested in source monitoring, it was felt that it would still be worth trying to coordinate with it.